

[0483] It should be noted that dimensions, sizes, and quantities listed herein are exemplary, and the present invention is in no way limited thereto. In an exemplary embodiment of the invention, a patch-sized fluid delivery device may be approximately 6.35 cm (~2.5 in) in length, approximately 3.8 cm (~1.5 in) in width, and approximately 1.9 cm (~0.75 in) in height, although, again, these dimensions are merely exemplary, and dimensions can vary widely for different embodiments.

[0484] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

1. A system comprising:

a reservoir comprising:

- a resilient cylindrical flexure portion that is able to expand and contract to change an interior volume within the resilient cylindrical flexure portion, wherein the resilient cylindrical flexure portion comprising a first end and a second end;
  - a central tube within the resilient cylindrical flexure portion extending from the first end to the second end of the resilient cylindrical flexure portion;
  - a collection chamber directly connected to the central tube; and
  - a pumping chamber coupled in fluid communication with the collection chamber and the central tube, wherein fluid flows from the collection chamber through the central tube and directly into the pumping chamber,
- wherein during a pumping mechanism's compression stroke, a pumping actuation member applies force directly on to, and deforms, a collection chamber wall forcing fluid to flow through the central tube and into the pumping chamber.

2. The system of claim 1, further comprising a disposable housing assembly adapted to be secured to a user's skin.

3. The system of claim 2, further comprising a base portion comprising the reservoir, the base portion having a reservoir cavity, and a fluid path, the reservoir cavity comprising the outlet port and a septum, the fluid path comprising a fluid channel from the outlet port to a cannula port.

4. The system of claim 2, further comprising a needle insertion device for inserting a cannula into the user's skin, the needle insertion device comprising an introduction needle for movement between a retracted position and an extended position,

wherein the disposable housing assembly has a passage through which the introduction needle extends, and

wherein the cannula has a central passage through which the introduction needle extends.

5. The system of claim 2, further comprising a reusable housing assembly adapted to be secured to the disposable housing assembly, the reusable housing assembly comprising a volume sensing device, wherein the volume sensing device determines the volume of fluid delivered to the user.

6. The system of claim 5, wherein the reusable housing assembly further comprising a latching mechanism for permitting selective engagement and disengagement with the disposable housing assembly.

7. The system of claim 2, further comprising a pad coupled to a bottom of the disposable housing assembly, the pad for attaching the disposable housing assembly to the user.

8. A system, comprising:

a disposable housing assembly adapted to be secured to a user's skin; and

a reservoir comprising:

- a flexible membrane, wherein the flexible membrane directly connected to a collection chamber; and
  - a pumping chamber coupled in fluid communication with the collection chamber and a central tube,
- wherein during a pumping mechanism's compression stroke, a pumping actuation member applies force directly on to, and deforms, a collection chamber wall forcing fluid to flow through the central tube and into the pumping chamber, wherein fluid flows from the collection chamber through the central tube and directly into the pumping chamber;

a plunger head located adjacent to the reservoir;

a plunger arm connected to the plunger head;

a driving shaft connected to the plunger arm; and

a motor connected to the driving shaft, the motor controllable to move the drive shaft in a first motion so as to move the plunger arm and advance the plunger head against the flexible membrane, and the motor controllable to move the drive shaft in a second motion so as to move the plunger arm and retract the plunger head from the flexible membrane, wherein fluid is retained in the collection chamber until the plunger head interacts with the flexible membrane to pump the fluid out of the collection chamber.

9. (canceled)

10. The system of claim 8, further comprising a base portion comprising the reservoir, the base portion having a reservoir cavity, and a fluid path, the reservoir cavity comprising the outlet port and a septum, the fluid path comprising a fluid channel from the outlet port to a cannula port.

11. The system of claim 8, further comprising a needle insertion device for inserting a cannula into the user's skin, the needle insertion device comprising an introduction needle for movement between a retracted position and an extended position,

wherein the disposable housing assembly has a passage through which the introduction needle extends, and

wherein the cannula has a central passage through which the introduction needle extends.

12. The system of claim 8, further comprising a reusable housing assembly adapted to be secured to the disposable housing assembly, the reusable housing assembly comprising a volume sensing device, wherein the volume sensing device determines the volume of fluid delivered to the user.

13. The system of claim 12, wherein the reusable housing assembly further comprising a latching mechanism for permitting selective engagement and disengagement with the disposable housing assembly.